

RESEARCH ARTICLE**POLICE OFFICER DEATHS IN THE U.S.****Assessing dangerousness in policing****An analysis of officer deaths in the United States, 1970–2016**Michael D. White¹ | Lisa M. Dario² | John A. Shjarback³¹ Arizona State University² Florida Atlantic University³ University of Texas at El Paso**Correspondence**

Michael D. White, School of Criminology and Criminal Justice, Arizona State University, 411 N. Central Avenue Suite 680, Phoenix, AZ 85004.

Email: mdwhite1@asu.edu

Research Summary: A robust body of research findings has established that policing is a dangerous profession. Few scholars, however, have investigated the full picture of the hazards in policing, which includes deaths occurring in both felonious and nonfelonious circumstances. In this study, we examine nearly 50 years of all police officer line-of-duty deaths (1970–2016) using data from the Officer Down Memorial Page. We focus on long-term trends in felonious and nonfelonious deaths annually, as well as on trends in incident-level characteristics. We also employ interrupted time-series analysis (ARIMA) to test the “war on cops” thesis post-Ferguson.

Policy Implications: The number of line-of-duty deaths has declined dramatically over the last five decades. Policing is a much safer profession now than it was 50 years ago. Despite a 75% drop in deaths, however, there has been remarkable stability in geographic-, temporal-, and incident-level characteristics. Also, several notable changes over time reflect favorably on improved safety in policing, such as declines in deaths resulting from aircraft crashes and accidental gunfire. Other trends are troubling, though, such as the stability in deaths during auto pursuits and a two-fold increase in deaths from vehicular assaults. Currently, the “war on cops” thesis is not supported by any

evidence, and we apply the 50-year lens in this study to provide important context for understanding recent trends in officer deaths.

KEYWORDS

line-of-duty deaths, police officer deaths, violence against police

The “bulletproof cop” does not exist. The officers who protect us must also be protected against incapacitating physical, mental, and emotional health problems as well as against the hazards of their job. Their wellness and safety are crucial for them, their colleagues, and their agencies, as well as the well-being of the communities they serve.

—President's Task Force on 21st Century Policing, 2015: 62

Research findings over the last several decades have consistently shown policing to be a dangerous profession. Bierie (2017) noted that approximately 10% of all police officers are assaulted in a given year. Data from the National Institute for Occupational Safety (NIOSH, 1996) indicate that police officers experience the second highest rate of workplace homicides (behind taxi drivers), and more generally, researchers have found that police have the highest occupational rate of violent victimization (fatal and nonfatal assaults; Duhart, 2001; Fridell, Faggiani, Taylor, Brito, & Kubu, 2009). The focus on dangerousness has become more acute since 2014 as a series of controversial police killings of citizens has produced public outrage, riots, and a national movement demanding police reform (i.e., blacklivesmatter.com). At the same time, there have been several high-profile attacks on police officers, most notably in Brooklyn (two officers killed, December 2014), Dallas (five officers killed, July 2016), and Baton Rouge (three officers killed, July 2016). These attacks have led some to conclude that there is a “war on cops” (Canterbury, 2016; Mac Donald, 2016; Safir, 2015).¹

A sizeable body of research has been aimed at exploring the dangerousness of the police profession by examining available data on felonious assaults and killings of police officers (Fridell & Pate, 1993; Kaminski & Marvell, 2002; Kent, 2010; Lester, 1981, 1984; Meyer, Magedanz, Dahlin, & Chapman, 1981). These researchers have produced an accurate estimate of how often officers are assaulted and killed (Bierie, 2017; Maguire, Nix, & Campbell, 2017) and a firm understanding of the community-level (Bailey & Peterson, 1994; Jacobs & Carmichael, 2002), organizational-level (Fridell & Pate, 2001; Kaminski, 2002), and incident-level features (Mastrofski, Snipes, & Supina, 1996) that are associated with the phenomena. In fact, each year the Federal Bureau of Investigation releases a report on felonious assaults and killings of police, based on the Law Enforcement Officers Killed and Assaulted (LEOKA) Program (fbi.gov/about-us/cjis/ucr/leoka).² Moreover, Maguire et al. (2017) recently used data from the Officer Down Memorial (ODMP) webpage (odmp.org) to test whether felonious killings of police have increased notably since the death of Michael Brown in Ferguson.

Felonious killings of police represent a critically important phenomenon worthy of empirical study, but these tragic cases represent only a subset of the larger universe of police officer line-of-duty deaths. Both LEOKA and the National Law Enforcement Officers Memorial Fund (NLEOMF) report data on accidental or nonfelonious deaths of police officers, although examinations of those data are conducted infrequently. The lack of research on nonfelonious deaths of officers is troubling given that data suggest that nonfelonious deaths may outnumber felonious killings (nleomf.com; President's Task Force on 21st Century Policing, 2015). Brandl (1996: 256) noted the “conceptualization of dangerousness in the police occupation in terms of the murder and assault of police officers, to the exclusion of accidents,

is at least a partial function of the unique nature of police work and data accessibility,” and he offered several justifications for a broader view of dangerousness. First, regardless of how the death occurs, the consequences of officer line-of-duty deaths are tragic and multifaceted (e.g., emotional and economic), affecting officers’ families, coworkers, the agency, the community, and the entire profession (see also Fridell et al., 2009; Kaminski & Sorenson, 1995). Second, a broader definition may provide additional insights on ways in which policy and training can reduce all risks for officers (Brandl, 1996). Last, “if empirical conclusions about the dangerousness of the job are to be drawn, they may be most accurately formed from analyses not only of felonious injuries and deaths, but also accidental ones” (Brandl, 1996: 256).

For this study, we adopted Brandl's (1996) broad definition of dangerousness because we believe researchers’ near-exclusive focus on felonious victimizations provides only a partial picture of the hazards of policing in the United States. The quote from the President's Task Force on 21st Century Policing at the beginning of this article emphasizes this point and highlights the consequences of failing to address adequately the wide-ranging threats to officer wellness and safety. Simply put, a full understanding of the hazards of the police profession requires a comprehensive examination of all officer line-of-duty deaths that are caused by felonious attacks, accidents, and other nonfelonious circumstances resulting from the nature of the job (e.g., heart attack and duty-related illness). Few researchers have adopted such a perspective in their studies, and as a result, our understanding of police dangerousness remains underdeveloped.³

We address this research gap through an examination of all officer line-of-duty deaths in the United States over a 47-year period (1970–2016) using the ODMP. The ODMP represents perhaps the most comprehensive and detailed data source on the hazards of policing because it includes both felonious and nonfelonious deaths of all police officers working in the United States, and it provides a narrative of the encounter that captures incident, officer, and suspect-related (if felonious) features of the line-of-duty death. We first explore long-term trends in total, felonious, and nonfelonious officer deaths over the last nearly 50 years. We also conduct a temporal, decade-by-decade investigation of incident-level features of deaths, including an examination of encounter-based trends over time, as well as a comparison of those trends among felonious and nonfelonious deaths. Last, interrupted times-series analysis is employed with felonious police killings to test for an increase post-Ferguson (August 2014), thereby placing the current “war on cops” debate in a larger historical context.

1 | PRIOR RESEARCH

1.1 | Data sources and prevalence

In prior studies, researchers have used a handful of different data sources to study police officer deaths. The most commonly used data source is the FBI's LEOKA program, which is published annually for all agencies that report to the Uniform Crime Reporting (UCR) system (e.g., Bailey & Peterson, 1987; Jacobs & Carmichael, 2002; Kaminski & Stucky, 2009; Kent, 2010; Lester, 1984). Kaminski and Marvell (2002) compiled a database of felonious killings of police from 1903 to 1998, using information from the NLEOMF. Both the LEOKA and NLEOMF data capture information on felonious killings and accidental deaths, although academic studies using these data have been focused almost exclusively on felonious deaths (Batton & Wilson, 2006).⁴ The National Incident-Based Reporting System (NIBRS) is another popular source of data used by researchers to study violence against police (e.g., Fridell et al., 2009; Willits, 2014). Scholars have also used official data from one or more police departments (e.g., Gibbs, Ruiz, & Klapper-Lehman, 2014; Rabe-Hemp & Schuck, 2007).

The Centers for Disease Control and Prevention (CDC) have data on violent deaths available through their National Violent Death Reporting System (NVDRS); it does not stratify data by occupation, however, so officer deaths are not verifiable through this data set. Still, the CDC and the NIOSH do provide several reports on officer health, safety, and life expectancy.⁵ Other studies have included unpublished FBI data (Bailey, 1982), obituaries, and the National Death Index (e.g., Violanti, Vena, & Petralia, 1998).

Felonious attacks on police are a statistically rare event. According to the Bureau of Justice Statistics, in 2009, police made 13.6 million arrests (Snyder, 2011), and data from the FBI's (2010) LEOKA program indicate that 57,268 officers were assaulted that same year—translating into aggression against police in less than one half of 1% of arrests. Most aggression toward police results in minor injuries, and only a tiny percentage result in death (Bierie, 2017). Although statistically rare, the sheer volume of encounters between police and citizens, more than 40 million per year, means that violence against police is a daily event. LEOKA (2011) data indicate that officers are assaulted in approximately 160 encounters per day. Viewed differently, approximately 10% of officers in the United States experience an assault each year (Bierie, 2017; see also Duhart, 2001). In terms of longer trends in police victimization, data from LEOKA show that rates of police killings declined significantly from the early 1970s to the 1990s (Quinet, Bordua, & Lassiter, 1997).

Research on nonfelonious deaths and injuries of police is much less robust. One study's findings showed that, from 1983 to 1992, 699 officers were killed accidentally in the United States, and the results of longer term analyses reveal that the frequency of accidental deaths has increased since the early 1970s (Fridell & Pate, 1993). More recent data from the FBI indicate that 49% of all officer fatalities from 2003 to 2012 were caused by vehicle-related accidents (President's Task Force on 21st Century Policing, 2015). In one of the few academic studies aimed at examining officer injuries from both felonious attacks and accidents, Brandl (1996) found that 92% of reported injuries occurred as a result of accidents.

1.2 | Correlates of violence against police

Scholars have devoted significant attention to studying the correlates of officer line-of-duty deaths, although most studies have been focused on felonious attacks, both fatal and nonfatal (Bierie, 2017; Fridell et al., 2009). In this body of research, scholars have identified correlates of police officer victimization at multiple units of analysis, including the community, organizational, and situational/individual levels.

1.2.1 | Community-level variables

Several researchers have found variation in violence against police by region of the country (i.e., the south is the most violent; Cardarelli, 1968; Kaminski, Jefferis, & Chanhathasilpa, 2000). Several study findings have found links between officer victimization rates and community violence, suggesting that crime in officers' work environment represents an indicator of risk to their safety (Fridell et al., 2009; Jacobs & Carmichael, 2002; Kaminski, 2008; Kaminski, Jefferis, & Gu, 2003; Lester, 1982, 1984; Shjarback & White, 2016). Kent (2010) reported a significant association between officer killings of citizens and police officer homicides.⁶ Indicators of social disorganization and economic distress have also been linked to police victimization rates (Kaminski & Marvell, 2002; Willits, 2014). Batton and Wilson (2006) found a strong relationship between homicides of police officers and economic disadvantage, such as rates of unemployment, public assistance, and income inequality (see also Kaminski et al., 2003; Morrison & Meyer, 1974; Peterson & Bailey, 1988; Regens, Meyer, Swanson, & Chapman, 1974).⁷

Several studies have been aimed at exploring the relationship between gun ownership rates and violence against police. Both Lester (1978, 1984) and Swedler, Simmons, Dominici, and Hemenway (2015) found that gun ownership rates were associated with police victimization, but other scholars have documented no such relationship (Kaminski & Marvell, 2002; Southwick, 1998). Batton & Wilson (2006) reported a significant negative association between incarceration rates and felonious killings of officers. Some scholars have found an association between police victimization rates and the percentage of African Americans in a community (e.g., Bailey & Peterson, 1994; Chamlin, 1989; Kaminski & Stucky, 2009; Morrison & Meyer, 1974), but others have found no such effect (Fridell & Pate, 1995; Peterson & Bailey, 1988).

Researchers have examined the relationship between political environment and police officer victimization. Jacobs and Carmichael (2002) found lower rates of officer deaths in cities with African American mayors (see also Kaminski & Stucky, 2009). Several scholars have explored racial economic inequality as a political measure with mixed results (Jacobs & Carmichael, 2002; Kaminski, 2004; Kaminski & Stucky, 2009). Kent (2010), for example, found that three measures of political conditions (income racial inequality, size of the Black population, and mayor's race/ethnicity) were associated with officer killings.

1.2.2 | Agency-level variables

In addition to community-level factors, researchers have examined the impact of various agency-level variables on rates of police victimization. Both Fridell and Pate (1995) and Kaminski (2002) found no relationship between training hours and police killings. Fridell and Pate (2001) found higher assault rates among one-officer patrol cars (compared with two-officer cars). Kaminski (2002), however, found no such relationship. Research findings have documented a clear link between the presence of body armor and lower risk of officer death (Fridell et al. 2009; Kaminski, 2002). In fact, the Federal Bureau of Investigation (1995) concluded that officers are 14 times more likely to be killed if they are not wearing soft body armor (see also Pate & Fridell, 1993).

Willits (2014) found that features of organizational complexity, including greater unit specialization and a greater number of substations, were related to lower rates of assaults on officers; alternatively, vertical differentiation (number of rank levels), body armor requirements, presence of a civilian review board, and community meetings were not related to officer assaults. Researchers have also documented an association between aggressive patrol style and greater rates of assault (Kaminski et al., 2003; Morrison & Meyer, 1974; Regens et al., 1974; but see Wilson & Zhao, 2008). Fridell et al. (2009: 550) concluded that “agencies that have a culture of aggressiveness will likely ‘produce,’ not just more force against subjects, but also violence against police.”

1.2.3 | Incident-level variables

Several researchers have explored whether certain types of calls generate an elevated risk of victimization for police (Ellis, Choi, & Blaus, 1993; Garner & Clemmer, 1986; Uchida, Brooks, & Koper, 1987). Stanford and Mowry (1990) found that domestic calls were associated with higher rates of officer injury. Margarita (1980) found that suspects who killed New York City police officers were most commonly engaged in robbery or other types of weapon crimes. Researchers have also focused attention on suspect and officer characteristics, with mixed results. Levels of resistance may vary by suspect sex (Covington, Huff-Corzine, & Corzine, 2014; Mastrofski et al., 1996), but males are more likely to exhibit violent resistance (Bierie, Detar, & Craun, 2016). Meyer et al. (1981) found that suspects who kill police officers are less likely to be under the influence of drugs or alcohol than are offenders who commit less serious offenses against police. Both Kachurik, Ruiz, and Staub (2013) and Gibbs

et al. (2014) found that officers are less likely to be killed feloniously if they have greater social investment, measured as having a spouse and/or children. In perhaps the most comprehensive study of the issue to date, Bierie (2017) identified several incident-level characteristics that were associated with an increased risk of assault against police, including number of offenders present, location (outdoors), male offenders, crime type (assault, robbery), number of offenses, and offenders under the influence of alcohol.⁸

1.3 | The Ferguson effect and a “war on cops”

The focus on police officer line-of-duty deaths has intensified considerably since the summer of 2014. The increased attention can be traced back to several high-profile deadly force incidents involving minority citizens (e.g., Michael Brown, Eric Garner, Freddie Gray, Tamir Rice, and Walter Scott), which have led to public protests, civil disorder, and a national movement demanding police reform. A contentious debate has emerged over the existence of a “Ferguson Effect” (Mac Donald, 2015), which is defined as an alleged nationwide increase in crime resulting from one of two (or both) hypothesized processes: (1) the empowering of criminals and others to engage in crime because of an erosion of perceived trust and legitimacy for police (see, e.g., Jackson et al., 2012; Tyler, 2006) and (2) officers shirking their responsibilities and retreating from active police work because of negative attention (i.e., “de-policing”; see also Shjarback, Pyrooz, Wolfe, & Decker, 2017). Additionally, select police executives, politicians, and conservative essayists have made the claim that the increase in anti-police rhetoric, specifically from the Black Lives Matter movement, has created a dangerous environment for officers, proposing a new “war on cops” (Hattem, 2015; Mac Donald, 2016; Safir, 2015). For example, Chuck Canterbury (2016), national president of the Fraternal Order of Police, weighed in on the issue with an open letter to then-President Obama stating:

It is not just talk; it is not just rhetoric. Those spewing this hatred and those calling for violence are having an impact. They have been given a platform by the media to convey the message that police officers are their enemy and it is time to attack that enemy ... There is a very real and very deliberate campaign to terrorize our nation's law enforcement officers.

A handful of scholars has sought to test elements of a “Ferguson Effect” directly, particularly as it relates to crime rates and depolicing.⁹ In regard to allegations of a “war on cops,” Maguire and colleagues (2017) found no evidence that the events in Ferguson (and after) led to an increase in felonious killings of police officers. By focusing on a time period spanning January 2010 through March 2016 and by using an intervention of August 2014, they found that anti-police rhetoric was not associated with a rise in the number of police officers murdered across multiple interrupted time-series estimation techniques. The analyses and their findings were robust, indicating no evidence of either an abrupt or gradual increase in felonious homicides post-Ferguson.

1.4 | Limitations in prior research

Batton and Wilson (2006) highlighted several shortcomings in prior research on police officer line-of-duty deaths, noting that most studies are descriptive and cross-sectional in nature.¹⁰ Although the results of these studies have improved our understanding of certain features of the phenomena, they have provided little insight into longer term trends in officer deaths, as well as into the factors that influence those trends (for exceptions, see Batton & Wilson, 2006; Kaminski & Marvell, 2002). Moreover, much of the research has been designed with a narrow focus in which accidental and nonfelonious deaths are excluded, thereby presenting only a portion of the overall picture of the hazards of the police

profession. In the current study, we seek to address many of these limitations through a longitudinal investigation of all police line-of-duty deaths—both felonious and nonfelonious—across a nearly 50-year period.

2 | DATA AND METHOD

Our goal is to answer three research questions: (1) How has the prevalence of line-of-duty deaths—both felonious and nonfelonious—changed over time? (2) How have the incident-level features of felonious and nonfelonious line-of-duty deaths changed over time? (3) Is there evidence to support the claim of a “war on cops” since 2014? To study these questions, we use data from the ODMF.¹¹ The ODMF, founded in 1996, has worked with assistance from the National Law Enforcement Officers Memorial Fund, Inc. to glean information on officer line-of-duty deaths dating back to the 1790s. The ODMF asserts its mission as follows:

The Officer Down Memorial Page, Inc., (ODMF) is a non-profit organization dedicated to honoring America's fallen law enforcement heroes. More than 22,000 officers have made the ultimate sacrifice in the United States since 1791, and it is with great honor that the ODMF preserves their memories within its pages. The countless stories of selfless courage and heroism exhibited by officers who lost their lives while serving and protecting the citizens of this great nation are a testament to the dedication of those men and women who wear the badge.

The ODMF captures all officer line-of-duty deaths, but it does not capture officer suicides. As a result, officer suicides are not part of our study. This omission is notable given recently released data indicating that suicides increased in 2017 and tripled all line-of-duty deaths in that same year (Hays, 2018).

To collect these data, multiple student coders¹² completed an abstraction form (available by request) for each officer's death. This form includes such variables as agency type; officer rank; officer sex; officer age; marital status; surviving children; duty status; incident date; cause of death; state in which the officer death occurred; and if felonious, suspect-related variables (weapon type, age, sex, race-ethnicity, etc.; see Tables 1 and 2). Coding occurred between February 2015 and May 2017. A 10% reliability check was conducted for each year to ensure coder consistency, and errors never exceeded 2% of variables coded in any given year. Inconsistencies in the data were resolved prior to conducting the analyses.

To examine changes in the prevalence of line-of-duty deaths and changes related to incident-level features (research questions one and two), descriptive analyses are employed and supplemented with visual representations of the results. Raw trends are presented as well as standardized annual rates by both the number of police officers per year and the number of violent crimes per year. The rationale for standardization by the number of officers is straightforward: The number of line-of-duty deaths will be affected by the number of officers working. In 1970, there were 276,056 officers in the United States. In 2016, there were 640,231. Standardization by the number of officers ensures that any change in line-of-duty deaths is not simply the result of more officers on the streets. Standardization by violent crime is included because researchers up to this point have consistently identified a link between community violence and attacks on police (e.g., Jacobs & Carmichael, 2002), as well as because violent crime rates have varied notably during the study period.

In research question three, the hypothesized “war on cops” is addressed. A “war on cops” effect was examined in one recent study (Maguire et al., 2017) on felonious deaths of police. Maguire et al. (2017)

TABLE 1 Characteristics of felonious line-of-duty deaths, by decade

| Variable | 1970–1979 (<i>n</i> = 1,469) | 1980–1989 (<i>n</i> = 1,038) | 1990–1999 (<i>n</i> = 836) | 2000–2016 (<i>n</i> = 1,329) | Total (<i>N</i> = 4,672) |
|--------------------------|----------------------------------|----------------------------------|--------------------------------|----------------------------------|------------------------------|
| Incident | | | | | |
| Agency Type | | | | | |
| Local (city, municipal) | 60.2 (885) | 55.2 (573) | 53.6 (448) | 59.7 (794) | 57.8 (2700) |
| County/parish (sheriff) | 19.8 (291) | 23.0 (239) | 25.2 (211) | 23.3 (310) | 22.5 (1051) |
| State (highway patrol) | 9.7 (143) | 9.7 (101) | 8.9 (74) | 7.4 (99) | 8.9 (417) |
| Federal | 2.0 (30) | 3.2 (33) | 5.4 (45) | 2.1 (28) | 2.9 (136) |
| Corrections/jail | 5.3 (78) | 5.0 (52) | 3.3 (28) | 2.6 (34) | 4.1 (192) |
| Other (gaming, housing) | 2.9 (42) | 3.9 (40) | 3.6 (30) | 4.8 (64) | 3.8 (176) |
| Month of Incident | | | | | |
| January | 9.3 (136) | 10.8 (112) | 10.3 (86) | 7.4 (98) | 9.2 (432) |
| February | 7.2 (106) | 8.8 (91) | 7.8 (65) | 6.8 (91) | 7.6 (353) |
| March | 7.1 (105) | 7.5 (78) | 8.1 (68) | 8.7 (116) | 7.9 (367) |
| April | 9.3 (136) | 7.3 (76) | 9.9 (83) | 6.2 (82) | 8.1 (377) |
| May | 8.0 (118) | 6.5 (67) | 9.1 (76) | 8.2 (109) | 7.9 (370) |
| June | 8.0 (118) | 8.9 (92) | 8.4 (70) | 8.1 (107) | 8.3 (387) |
| July | 8.4 (124) | 8.9 (92) | 7.7 (64) | 9.4 (125) | 8.7 (405) |
| August | 9.6 (141) | 7.1 (74) | 8.0 (67) | 9.7 (129) | 8.8 (411) |
| September | 8.5 (125) | 9.1 (94) | 6.8 (57) | 12.9 (172) | 9.6 (448) |
| October | 7.4 (108) | 8.1 (84) | 9.1 (76) | 7.1 (94) | 7.7 (362) |
| November | 7.5 (110) | 8.8 (91) | 6.0 (50) | 7.7 (102) | 7.6 (353) |
| December | 9.7 (142) | 8.4 (87) | 8.9 (74) | 7.8 (104) | 8.7 (407) |
| Officer | | | | | |
| Sex (Male) | 99.5 (1462) | 96.5 (1002) | 95.9 (802) | 94.1 (1251) | 96.7 (4517) |
| Rank | | | | | |
| Front line (patrol) | 80.1 (1177) | 77.8 (808) | 78.2 (654) | 71.9 (955) | 76.9 (3594) |
| Supervisor (sergeant) | 7.3 (107) | 9.2 (96) | 9.6 (80) | 12.0 (159) | 9.5 (442) |
| Detective/ investigator | 3.9 (57) | 5.6 (58) | 5.1 (43) | 8.1 (107) | 5.7 (265) |
| Management | 8.7 (128) | 7.3 (76) | 7.1 (59) | 8.1 (108) | 7.9 (371) |
| Age (mean) | 35.5 (1279) | 36.0 (938) | 37.4 (797) | 39.6 (1289) | 37.2 (4303) |
| Length of service (mean) | 7.6 (1098) | 8.8 (756) | 9.7 (666) | 11.7 (1286) | 9.6 (3806) |
| Cause of Death | | | | | |
| Assault | 3.5 (52) | 3.9 (40) | 4.2 (35) | 2.6 (35) | 3.5 (162) |
| Gunfire | 78.8 (1157) | 73.8 (766) | 72.4 (605) | 62.8 (834) | 72.0 (3362) |
| Stabbed | 4.4 (64) | 3.9 (41) | 2.4 (20) | 1.4 (19) | 3.1 (144) |
| Terrorist attack | 0.1 (1) | 0.0 (0) | 1.0 (8) | 5.3 (71) | 1.7 (80) |
| Vehicle pursuit | 5.2 (76) | 5.9 (61) | 6.5 (54) | 6.2 (82) | 5.8 (273) |
| Vehicular assault | 7.3 (107) | 12.1 (126) | 12.9 (108) | 14.4 (191) | 11.4 (532) |
| Other | 0.8 (12) | 0.4 (4) | 0.7 (6) | 7.3 (97) | 2.5 (119) |

(Continues)

TABLE 1 (Continued)

| Variable | 1970–1979 (<i>n</i> = 1,469) | 1980–1989 (<i>n</i> = 1,038) | 1990–1999 (<i>n</i> = 836) | 2000–2016 (<i>n</i> = 1,329) | Total (<i>N</i> = 4,672) |
|------------------------------|----------------------------------|----------------------------------|--------------------------------|----------------------------------|------------------------------|
| Alone at Time of Incident | 44.6 (574) | 39.5 (314) | 45.1 (277) | 34.5 (436) | 40.4 (1601) |
| Survived by Spouse | 72.5 (884) | 74.5 (625) | 81.9 (538) | 77.8 (933) | 76.1 (2980) |
| Survived by Children | 65.7 (799) | 69.6 (578) | 82.4 (530) | 75.9 (912) | 72.4 (2819) |
| Off-Duty at Time of Incident | 7.3 (101) | 9.8 (89) | 10.7 (80) | 7.1 (92) | 8.3 (362) |
| State | 1970–1979 | 1980–1989 | 1990–1999 | 2000–2016 | Total |
| Alabama | 2.9 (43) | 2.9 (30) | 2.6 (22) | 2.2 (29) | 2.7 (124) |
| Alaska | 0.5 (8) | 0.7 (7) | 0.6 (5) | 0.7 (9) | 0.6 (29) |
| Arizona | 1.5 (22) | 2.2 (23) | 3.3 (28) | 2.6 (34) | 2.3 (107) |
| Arkansas | 1.0 (15) | 1.8 (19) | 2.0 (17) | 1.3 (17) | 1.5 (68) |
| California | 10.6 (155) | 9.4 (98) | 9.9 (83) | 8.3 (110) | 9.5 (446) |
| Colorado | 1.2 (18) | 1.4 (15) | 1.7 (14) | 1.6 (21) | 1.5 (68) |
| Connecticut | 0.4 (6) | 0.6 (6) | 0.4 (3) | 0.5 (6) | 0.4 (21) |
| Delaware | 0.1 (1) | 0.0 (0) | 0.1 (1) | 0.2 (3) | 0.1 (5) |
| Florida | 4.0 (59) | 7.3 (73) | 4.8 (40) | 4.9 (65) | 5.1 (240) |
| Georgia | 4.4 (65) | 4.1 (43) | 3.9 (33) | 4.5 (60) | 4.3 (201) |
| Hawaii | 0.1 (2) | 0.3 (3) | 0.6 (5) | 0.3 (4) | 0.3 (14) |
| Idaho | 0.2 (3) | 0.3 (3) | 0.5 (4) | 0.2 (3) | 0.3 (13) |
| Illinois | 5.0 (73) | 5.1 (53) | 2.9 (24) | 3.1 (41) | 4.1 (191) |
| Indiana | 1.8 (27) | 2.0 (21) | 2.4 (20) | 1.9 (25) | 2.0 (93) |
| Iowa | 0.7 (11) | 0.6 (6) | 0.2 (2) | 0.6 (8) | 0.6 (27) |
| Kansas | 0.8 (12) | 1.1 (11) | 1.2 (10) | 1.1 (14) | 1.0 (47) |
| Kentucky | 2.0 (29) | 1.8 (19) | 1.6 (13) | 1.4 (19) | 1.7 (80) |
| Louisiana | 2.5 (36) | 2.5 (26) | 2.5 (21) | 3.9 (52) | 2.9 (135) |
| Maine | 0.1 (2) | 0.5 (5) | 0.1 (1) | 0.0 (0) | 0.2 (8) |
| Maryland | 2.0 (30) | 1.5 (16) | 1.3 (11) | 2.3 (30) | 1.9 (87) |
| Massachusetts | 1.4 (20) | 1.7 (18) | 1.6 (13) | 0.8 (11) | 1.3 (62) |
| Michigan | 4.2 (61) | 3.6 (37) | 2.8 (23) | 2.9 (38) | 3.4 (159) |
| Minnesota | 1.0 (15) | 1.2 (12) | 1.2 (10) | 0.9 (12) | 1.0 (49) |
| Mississippi | 2.2 (33) | 2.9 (30) | 2.9 (24) | 2.0 (26) | 2.4 (113) |
| Missouri | 2.6 (38) | 1.8 (19) | 2.3 (19) | 2.3 (31) | 2.3 (107) |
| Montana | 0.3 (4) | 0.6 (6) | 0.4 (3) | 0.4 (5) | 0.4 (18) |
| Nebraska | 0.5 (8) | 0.2 (2) | 0.4 (3) | 0.2 (3) | 0.3 (16) |
| Nevada | 0.5 (8) | 0.3 (3) | 1.1 (9) | 0.8 (10) | 0.6 (30) |
| New Hampshire | 0.2 (3) | 0.0 (0) | 0.6 (5) | 0.3 (4) | 0.3 (12) |
| New Jersey | 2.4 (35) | 1.3 (14) | 2.3 (19) | 1.3 (17) | 1.8 (85) |
| New Mexico | 0.7 (11) | 1.7 (18) | 1.1 (9) | 0.8 (11) | 1.0 (49) |
| New York | 7.2 (106) | 6.9 (72) | 6.0 (50) | 15.1 (201) | 9.2 (429) |
| North Carolina | 3.8 (56) | 1.6 (17) | 4.7 (39) | 2.6 (34) | 3.1 (146) |
| North Dakota | 0.2 (3) | 0.2 (2) | 0.2 (2) | 0.2 (3) | 0.2 (10) |

(Continues)

TABLE 1 (Continued)

| State | 1970–1979 | 1980–1989 | 1990–1999 | 2000–2016 | Total |
|----------------|-----------|------------|-----------|-----------|-----------|
| Ohio | 3.7 (54) | 3.2 (33) | 3.1 (26) | 2.3 (30) | 3.1 (143) |
| Oklahoma | 2.0 (29) | 2.0 (21) | 1.7 (14) | 1.1 (14) | 1.7 (78) |
| Oregon | 0.6 (9) | 0.8 (8) | 1.0 (8) | 0.7 (9) | 0.7 (34) |
| Pennsylvania | 4.0 (59) | 2.7 (28) | 3.3 (28) | 3.3 (44) | 3.4 (159) |
| Rhode Island | 0.1 (1) | 0.2 (2) | 0.1 (1) | 0.1 (1) | 0.1 (5) |
| South Carolina | 2.2 (33) | 1.3 (14) | 2.6 (22) | 2.3 (30) | 2.1 (99) |
| South Dakota | 0.3 (4) | 0.3 (3) | 0.0 (0) | 0.4 (5) | 0.3 (12) |
| Tennessee | 2.7 (39) | 1.9 (20) | 2.8 (23) | 2.3 (31) | 2.4 (113) |
| Texas | 8.0 (118) | 10.1 (105) | 7.7 (64) | 9.2 (122) | 8.8 (409) |
| Utah | 0.5 (7) | 0.6 (6) | 0.5 (4) | 0.9 (12) | 0.6 (29) |
| Vermont | 0.1 (2) | 0.0 (0) | 0.0 (0) | 0.1 (1) | 0.1 (3) |
| Virginia | 2.1 (31) | 2.8 (29) | 1.4 (12) | 2.4 (32) | 2.2 (104) |
| Washington | 0.9 (13) | 1.4 (15) | 1.2 (10) | 1.6 (21) | 1.3 (59) |
| West Virginia | 1.3 (19) | 0.8 (8) | 0.2 (2) | 0.5 (6) | 0.7 (35) |
| Wisconsin | 1.3 (19) | 1.0 (10) | 2.3 (19) | 1.0 (13) | 1.3 (61) |
| Wyoming | 0.1 (2) | 0.2 (2) | 0.4 (3) | 0.0 (0) | 0.1 (7) |
| Washington, DC | 0.8 (12) | 0.4 (4) | 1.8 (15) | 0.2 (2) | 0.7 (33) |

constructed a weekly time series of deaths from January 2010 through March 2016 by using data from the ODMP. We extend this data set considerably by adding 40 years on the front end and including the rest of 2016 on the back end. This extension is important for two reasons. First, the recent “war on cops” dialogue is placed in a larger historical context—as part of a nearly 50-year time series. Second, there were several high-profile felonious killings of police during the latter half of 2016, most notably, in July 2016 (five Dallas police officers and three officers from Baton Rouge) (Maguire et al.’s [2017] data end in March 2016). Also, we temporally aggregate line-of-duty deaths by month for our analyses (not by week). But we do adopt Maguire et al.’s (2017) intervention approach by applying the death of Michael Brown in August 2014 as the starting point to investigate any changes in the prevalence of felonious killings of police officers.

To test the claim of a “war on cops” (research question three), we investigate both “abrupt permanent” and “gradual permanent” (McDowall, McCleary, Meidinger, & Hay, 1980) changes in the monthly number of felonious killings of police using interrupted time-series analysis or ARIMA.¹³ ARIMA modeling is a quasi-experimental design that allows for comparison of preintervention and postintervention values of an outcome. The technique is useful in overcoming threats to internal validity, and violations of the independence assumption (e.g., serial correlation) typically associated with time-series observations can be addressed (McDowall & McCleary, 2014; McDowall et al., 1980). ARIMA includes a two-stage process. The first stage, model identification, involves selecting the best-fitting trend model for the time series, composed of three model components: p , d , and q (referring to the autoregressive component, the trend component, and the moving average component of the model, respectively). The second stage involves inclusion of an intervention variable in the model with a hypothesized onset (abrupt or gradual) and duration (temporary or permanent; represented as “0” and “1” data points). We employed Stata 14.1 (StataCorp, College Station, TX) for this analysis.

TABLE 2 Characteristics of nonfelonious line-of-duty deaths, by decade

| Variable | 1970–1979 (<i>n</i> = 787) | 1980–1989 (<i>n</i> = 800) | 1990–1999 (<i>n</i> = 732) | 2000–2016 (<i>n</i> = 1,278) | Total (<i>N</i> = 3,597) |
|--------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|------------------------------|
| Incident | | | | | |
| Agency Type | | | | | |
| Local (city, municipal) | 53.9 (424) | 43.9 (351) | 37.8 (277) | 40.1 (512) | 43.5 (1564) |
| County/parish (sheriff) | 19.6 (154) | 28.7 (230) | 27.9 (204) | 32.7 (418) | 28.0 (1006) |
| State (highway patrol) | 15.4 (121) | 16.5 (132) | 16.3 (119) | 12.8 (164) | 14.9 (536) |
| Federal | 4.6 (36) | 5.0 (40) | 6.6 (48) | 6.8 (87) | 5.9 (211) |
| Corrections | 1.1 (9) | 1.9 (15) | 5.6 (41) | 3.7 (47) | 3.1 (112) |
| Other (gaming, housing) | 5.5 (43) | 4.0 (32) | 5.9 (43) | 3.9 (50) | 4.7 (168) |
| Month of Incident | | | | | |
| January | 8.1 (64) | 7.8 (62) | 8.9 (65) | 9.2 (117) | 8.6 (308) |
| February | 7.5 (59) | 9.3 (74) | 8.6 (63) | 6.4 (82) | 7.7 (278) |
| March | 7.6 (60) | 7.1 (57) | 7.1 (52) | 9.0 (115) | 7.9 (284) |
| April | 5.5 (43) | 6.4 (51) | 7.7 (56) | 7.0 (89) | 6.6 (239) |
| May | 8.8 (69) | 8.5 (68) | 10.7 (78) | 9.7 (124) | 9.4 (339) |
| June | 8.4 (66) | 7.2 (58) | 7.1 (52) | 8.2 (105) | 7.8 (281) |
| July | 9.8 (77) | 9.6 (77) | 8.1 (59) | 7.4 (94) | 8.5 (307) |
| August | 8.6 (68) | 9.0 (72) | 7.8 (57) | 7.4 (94) | 8.1 (291) |
| September | 8.1 (64) | 10.1 (81) | 6.8 (50) | 10.7 (137) | 9.2 (332) |
| October | 9.0 (71) | 9.4 (75) | 9.7 (71) | 9.0 (115) | 9.2 (332) |
| November | 7.8 (61) | 7.0 (56) | 9.6 (70) | 8.2 (105) | 8.1 (292) |
| December | 10.8 (85) | 8.6 (69) | 8.1 (59) | 7.9 (101) | 8.7 (314) |
| Officer | | | | | |
| Sex (Male) | 99.5 (783) | 96.9 (775) | 95.8 (701) | 95.1 (1216) | 96.6 (3475) |
| Rank | | | | | |
| Front line (patrol) | 77.4 (609) | 74.0 (592) | 75.0 (549) | 75.4 (963) | 75.4 (2713) |
| Supervisor (sergeant) | 7.5 (59) | 11.1 (89) | 12.4 (91) | 11.3 (144) | 10.6 (383) |
| Detective/ investigator | 5.0 (39) | 4.0 (32) | 3.8 (28) | 4.5 (57) | 4.3 (156) |
| Management | 10.2 (80) | 10.9 (87) | 8.7 (64) | 8.9 (114) | 9.6 (345) |
| Age (mean) | 37.6 (633) | 38.9 (662) | 39.5 (678) | 40.8 (1262) | 39.5 (3235) |
| Length of service (mean) | 8.5 (545) | 10.5 (533) | 11.2 (544) | 12.3 (1217) | 11.0 (2839) |
| Cause of Death | | | | | |
| Aircraft | 11.3 (89) | 11.9 (95) | 7.7 (56) | 3.5 (45) | 7.9 (285) |
| Car/motorcycle accident | 37.9 (298) | 38.0 (304) | 47.2 (346) | 52.0 (665) | 44.9 (1613) |
| Heart attack | 16.6 (131) | 16.4 (131) | 18.3 (134) | 16.3 (208) | 16.8 (604) |
| Gun (accidental) | 8.6 (68) | 6.8 (54) | 4.0 (29) | 3.5 (45) | 5.4 (196) |
| Struck by vehicle | 11.2 (88) | 16.0 (128) | 9.8 (72) | 10.6 (135) | 11.8 (423) |
| Drowned | 3.7 (29) | 2.5 (20) | 3.3 (24) | 2.5 (32) | 2.9 (105) |
| Other | 10.7 (84) | 8.4 (68) | 9.7 (71) | 11.6 (148) | 10.3 (371) |

(Continues)

TABLE 2 (Continued)

| Variable | 1970–1979 (<i>n</i> = 787) | 1980–1989 (<i>n</i> = 800) | 1990–1999 (<i>n</i> = 732) | 2000–2016 (<i>n</i> = 1,278) | Total (<i>N</i> = 3,597) |
|------------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|------------------------------|
| Alone at Time of Incident | 56.9 (374) | 37.7 (201) | 51.7 (264) | 54.6 (629) | 51.5 (1468) |
| Survived by Spouse | 65.8 (397) | 73.7 (425) | 80.5 (463) | 78.0 (895) | 75.1 (2180) |
| Survived by Children | 60.9 (365) | 71.2 (407) | 76.6 (431) | 77.2 (888) | 72.5 (2091) |
| Off-Duty at Time of Incident | 3.3 (24) | 2.3 (15) | 3.5 (23) | 6.6 (81) | 4.4 (143) |
| State | 1970–1979 | 1980–1989 | 1990–1999 | 2000–2016 | Total |
| Alabama | 3.6 (28) | 3.1 (25) | 3.3 (24) | 3.1 (39) | 3.2 (116) |
| Alaska | 0.4 (3) | 0.3 (2) | 0.7 (5) | 0.5 (6) | 0.4 (16) |
| Arizona | 2.2 (17) | 2.8 (22) | 1.8 (13) | 2.6 (33) | 2.4 (85) |
| Arkansas | 1.8 (14) | 2.4 (19) | 1.9 (14) | 1.4 (18) | 1.8 (65) |
| California | 8.3 (65) | 11.1 (89) | 9.2 (67) | 8.4 (107) | 9.1 (328) |
| Colorado | 1.5 (12) | 1.4 (11) | 1.1 (8) | 1.4 (18) | 1.4 (49) |
| Connecticut | 0.6 (5) | 0.8 (6) | 1.2 (9) | 0.2 (3) | 0.6 (23) |
| Delaware | 0.8 (6) | 0.1 (1) | 0.8 (6) | 0.1 (1) | 0.4 (14) |
| Florida | 5.0 (39) | 6.4 (51) | 7.5 (55) | 5.9 (76) | 6.1 (221) |
| Georgia | 3.0 (24) | 3.4 (27) | 4.4 (32) | 4.9 (62) | 4.0 (145) |
| Hawaii | 0.6 (5) | 0.1 (1) | 0.7 (5) | 0.7 (9) | 0.6 (20) |
| Idaho | 0.8 (6) | 0.4 (3) | 0.3 (2) | 0.3 (4) | 0.4 (15) |
| Illinois | 4.8 (38) | 3.3 (26) | 2.5 (18) | 2.7 (34) | 3.2 (116) |
| Indiana | 1.4 (11) | 1.9 (15) | 2.0 (15) | 2.0 (25) | 1.8 (66) |
| Iowa | 1.3 (10) | 0.8 (6) | 0.7 (5) | 0.5 (7) | 0.8 (28) |
| Kansas | 1.3 (10) | 0.4 (3) | 0.5 (4) | 0.6 (8) | 0.7 (25) |
| Kentucky | 2.0 (16) | 2.1 (17) | 1.1 (8) | 1.6 (21) | 1.7 (62) |
| Louisiana | 1.9 (15) | 2.0 (16) | 4.2 (31) | 3.5 (45) | 3.0 (107) |
| Maine | 0.5 (4) | 0.6 (5) | 1.0 (7) | 0.4 (5) | 0.6 (21) |
| Maryland | 2.8 (22) | 1.5 (12) | 1.4 (10) | 2.2 (28) | 2.0 (72) |
| Massachusetts | 2.2 (17) | 1.8 (14) | 2.2 (16) | 1.6 (20) | 1.9 (67) |
| Michigan | 1.7 (13) | 1.9 (15) | 2.0 (15) | 2.0 (25) | 1.9 (68) |
| Minnesota | 1.8 (14) | 0.5 (4) | 0.7 (5) | 0.9 (11) | 0.9 (34) |
| Mississippi | 0.6 (5) | 1.3 (10) | 1.5 (11) | 1.9 (24) | 1.4 (50) |
| Missouri | 1.7 (13) | 1.8 (14) | 2.5 (18) | 2.7 (34) | 2.2 (79) |
| Montana | 0.3 (2) | 0.8 (6) | 0.1 (1) | 0.6 (8) | 0.5 (17) |
| Nebraska | 0.4 (3) | 0.6 (5) | 0.3 (2) | 0.4 (5) | 0.4 (15) |
| Nevada | 0.8 (6) | 0.3 (2) | 1.4 (10) | 0.7 (9) | 0.8 (27) |
| New Hampshire | 1.0 (8) | 0.6 (5) | 0.1 (1) | 0.0 (0) | 0.4 (14) |
| New Jersey | 3.7 (29) | 2.3 (18) | 2.7 (20) | 2.6 (33) | 2.8 (100) |
| New Mexico | 0.5 (4) | 1.1 (9) | 1.1 (8) | 1.6 (20) | 1.1 (41) |
| New York | 7.5 (59) | 5.9 (47) | 3.8 (28) | 4.8 (61) | 5.4 (195) |
| North Carolina | 2.3 (18) | 1.4 (11) | 2.7 (20) | 3.8 (48) | 2.7 (97) |

(Continues)

TABLE 2 (Continued)

| State | 1970–1979 | 1980–1989 | 1990–1999 | 2000–2016 | Total |
|----------------|-----------|-----------|-----------|------------|------------|
| North Dakota | 0.3 (2) | 0.1 (1) | 0.3 (2) | 0.2 (3) | 0.2 (8) |
| Ohio | 5.1 (40) | 3.9 (31) | 2.6 (19) | 2.7 (35) | 3.5 (125) |
| Oklahoma | 1.8 (14) | 2.1 (17) | 2.3 (17) | 1.9 (24) | 2.0 (72) |
| Oregon | 1.0 (8) | 1.8 (14) | 0.8 (6) | 0.8 (10) | 1.1 (38) |
| Pennsylvania | 3.9 (31) | 4.8 (38) | 1.9 (14) | 2.4 (31) | 3.2 (114) |
| Rhode Island | 0.4 (3) | 0.1 (1) | 0.1 (1) | 0.4 (5) | 0.3 (10) |
| South Carolina | 1.1 (9) | 3.1 (25) | 2.7 (20) | 2.1 (27) | 2.3 (81) |
| South Dakota | 0.3 (2) | 0.1 (1) | 0.1 (1) | 0.2 (3) | 0.2 (7) |
| Tennessee | 1.9 (15) | 2.8 (22) | 3.1 (23) | 3.5 (45) | 2.9 (105) |
| Texas | 8.0 (63) | 8.6 (69) | 11.1 (81) | 11.3 (145) | 10.0 (358) |
| Utah | 0.5 (4) | 0.8 (6) | 1.0 (7) | 0.9 (12) | 0.8 (29) |
| Vermont | 0.1 (1) | 0.5 (4) | 0.1 (1) | 0.2 (2) | 0.2 (8) |
| Virginia | 2.5 (20) | 1.4 (11) | 2.5 (18) | 3.1 (40) | 2.5 (89) |
| Washington | 1.1 (9) | 1.5 (12) | 1.1 (8) | 1.4 (18) | 1.3 (47) |
| West Virginia | 0.5 (4) | 0.9 (7) | 0.4 (3) | 0.4 (5) | 0.5 (19) |
| Wisconsin | 2.0 (16) | 1.8 (14) | 1.4 (10) | 1.0 (13) | 1.5 (53) |
| Wyoming | 0.1 (1) | 0.5 (4) | 0.7 (5) | 0.2 (3) | 0.4 (13) |
| Washington, DC | 0.5 (4) | 0.8 (6) | 0.4 (3) | 0.8 (10) | 0.6 (23) |

3 | RESULTS

3.1 | Prevalence

The number of police officer line-of-duty deaths has dropped notably from 1970 to 2016. Officer deaths peaked in 1974 at 272; in 2016, there were 134 deaths. Figure 1 shows the annual number of officer deaths—total, felonious, and nonfelonious¹⁴—during the study period, standardized by the total number of police officers each year (number of deaths per 100,000 officers).¹⁵ When controlling for the number of officers, two clear themes emerge. First, the annual decline in total deaths is dramatic, from a high of 81 per 100,000 officers in 1970 to 18–20 per 100,000 the last 5 years (2012–2016; a decline of 75%). Felonious deaths have dropped by more than 80% (from 52 per 100,000 in 1970 to an average of 10 per 100,000 the last 5 years). The only anomaly is 2001 when more than 70 officers were killed during the 9/11 terrorist attack. Nonfelonious deaths have also declined notably from 29 per 100,000 in 1970 to approximately 9 per 100,000 during the last 5 years.

The second theme from Figure 1 involves the changes over time in the proportion of deaths that are felonious and nonfelonious. During the 1970s, there was a notable gap between felonious and nonfelonious, with felonious deaths occurring more frequently. By the mid-1990s, this gap disappeared, and during the last 20 years, the annual rates of felonious and nonfelonious deaths have been equivalent. Figure 2 shows officer deaths standardized by annual violent crime rates in the United States (number of officer deaths per 100,000 violent crimes).¹⁶ The declining trend is nearly identical to Figure 1 through the early 1990s, although the rates increased during the end of the decade and remained flat through 2012. There was a slight downward trend during the last 5 years of the study period, and the narrowing gap between felonious and nonfelonious deaths was again evident. Regardless of how officer

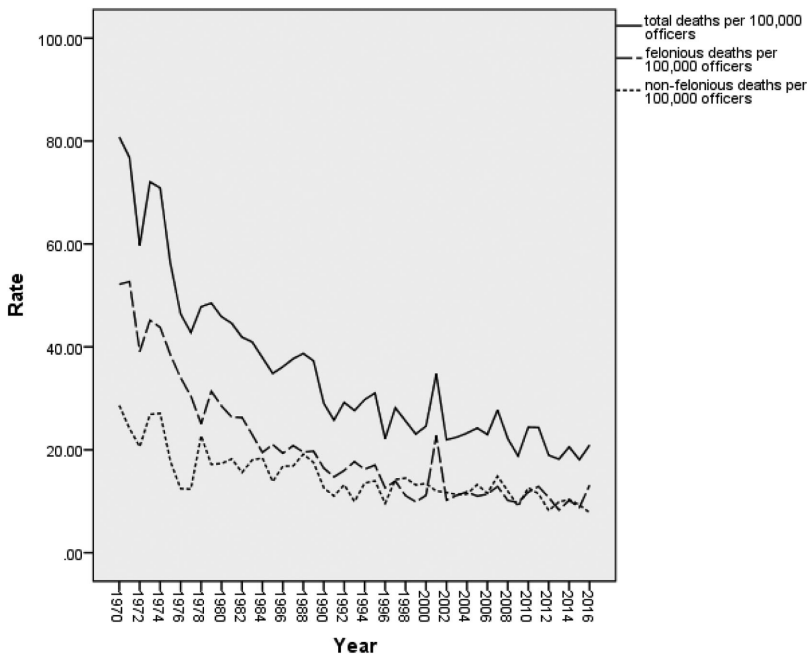


FIGURE 1 Total, felonious, nonfelonious line-of-duty deaths, 1970–2016—per 100,000 officers

deaths are standardized, it is clear the level of dangerousness in policing has dropped notably during the last 50 years.

3.2 | Historical examination of line-of-duty death characteristics

We also collected a range of incident-level characteristics for the 8,270 deaths in the current study. Deaths are separated into felonious and nonfelonious, and we applied a decade-by-decade time classification scheme to examine trends over time (1970–1979, 1980–1989, 1990–1999, 2000–2016). Tables 1 and 2 show the characteristics of felonious and nonfelonious deaths by decade, respectively. There is a large amount of information in Tables 1 and 2, so the presentation of results highlights the notable themes over time. Three important themes can be drawn from this analysis. First, despite large reductions in deaths over the study period (Figure 1), most characteristics of felonious and nonfelonious deaths remained remarkably stable during the last 50 years. For example, approximately 60% of felonious deaths have involved officers in local/municipal departments (Table 1). This finding is likely explained by the fact that local police officers spend much more of their time responding to calls for service and interacting with citizens and suspects, compared with state and federal officers. For both felonious and nonfelonious deaths, there has been little variation in the proportion of deaths per month, generally 7% to 9%. Most officers who died were male (97%), although there have been slight declines over time as females have become increasingly integrated into the profession. For nonfelonious deaths, three quarters of officers were patrol/line level with little change during the study period. For felonious deaths, approximately 8% of officers were off-duty at the time of death.

Perhaps the strongest evidence of stability is the proportion of deaths that have occurred in each state. Tables 1 and 2 show that, over the entire study period, there has been striking consistency in the geographic distribution of both felonious and nonfelonious deaths. Officer deaths overall were most common in California (8% to 11%), Texas (8% to 11%), Florida (4% to 7%), and New York (4% to 15%).

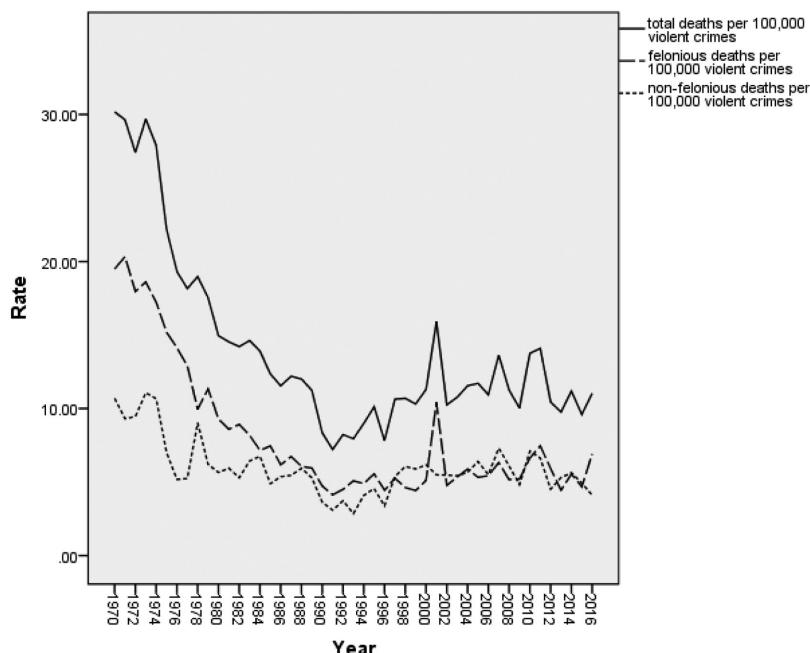


FIGURE 2 Total, felonious, nonfelonious line-of-duty deaths, 1970–2016—per 100,000 violent crimes

The prevalence of deaths in these four states is proportionate to the number of officers employed in those states.¹⁷ More than 40 states and Washington, DC, each have represented less than 3% of the felonious and nonfelonious deaths in a given decade. Across the decades, the proportion of deaths in a given state rarely has varied by more than 3%. The one exception has been felonious deaths in New York from 2000 to 2016, as a result of the September 11, 2001 terrorist attacks (15.1% of deaths occurred in New York).

The second major theme is that several characteristics have changed notably over time. For example, the proportion of nonfelonious deaths involving officers working in county/parish agencies increased notably over time, from 19.6% in 1970–1979 to 32.7% in 2000–2016. There has been no corresponding trend with department type among felonious deaths. Also, for felonious deaths, the percentage of officers who were supervisors and detectives nearly doubled over time: from 7.3% (1970–1979) to 12% (2000–2016) for supervisors, and 3.9% (1970–1979) to 8.1% (2000–2016) for detectives. Officer age and length of service increased notably over time for both types of death by approximately 4 years. Also, most officers who died were married and had children (approximately 75% and 72%, respectively), but both increased over time (by 5% to 15%).

There are also notable changes in cause of death. For felonious deaths, gunfire is the most common cause (approximately three quarters overall), but deaths resulting from gunfire decline over time. This is explained, in part, by the 9/11 terrorist attacks—both deaths occurring that day as well as those occurring later as a result of 9/11-related illness (other, $n = 92$). Deaths resulting from vehicular assaults (e.g., officers being struck by drivers impaired from alcohol/drugs) also doubled during the study period, from 7.3% in 1970–1979 to 14.4% in 2000–2016. Interestingly, deaths occurring during automobile pursuits remained stable over time (5% to 6%) despite policy changes adopted by departments to restrict and control pursuits (Alpert, 1997).

In addition, significant shifts in cause of death occurred among nonfelonious cases. The most common cause was automobile/motorcycle accidents, and the proportion increased significantly over time,

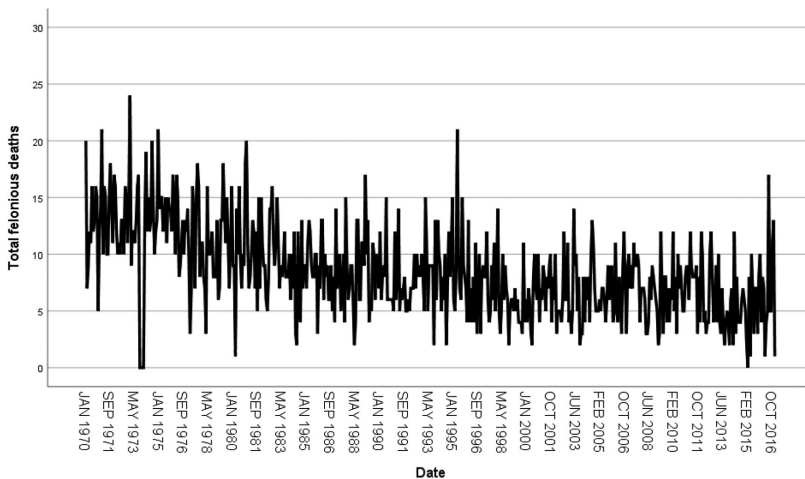


FIGURE 3 Felonious line-of-duty deaths by month, 1970–2016

from 37.9% in 1970–1979 to 52.0% in 2000–2016. Alternatively, two causes of death decreased significantly over time: Accidental gunfire declined from 8.6% in 1970–1979 to 3.5% in 2000–2016, and aircraft deaths declined from 11.3% to 3.5%.

The last major theme from Tables 1 and 2 involves the similarities in case characteristics across felonious and nonfelonious deaths. Notable consistency was found across felonious and nonfelonious deaths in date (month), location (state), and officer characteristics (sex, rank, length of service, surviving spouse and children), and this consistency persisted across the near-50-year study period. There were a few differences as well. Nonfelonious deaths were more common in county (28.0% vs. 22.5% for felonious) and state (14.9% vs. 8.9%) agencies. Officers who died in nonfelonious circumstances were slightly older (39.5 years old vs. 37.2 for felonious) and were less likely to be off-duty at the time of death (4.4% vs. 8.3% for felonious). Last, officers who died in nonfelonious circumstances were more likely to be alone at the time of death (51.5% vs. 40.4% for felonious).

3.3 | “War on cops” debate

Figure 3 shows the monthly number of felonious deaths of police, 1970–2016. Note that the data employed in this analysis are not standardized by the number of officers or by violent crime because those data are not available at the monthly level. Over time, the monthly average dropped significantly, from approximately 13 deaths per month from 1970–1974 to 5.5 deaths per month from 2012–2016. Note that in Figure 3, September 2001 is excluded because the large number of deaths that month (77) masks the larger declining trend. In fact, September 2001 skews the model identification process, and as a result, the month was removed from the ARIMA analysis. There was also a spike in felonious deaths in the last half of 2016, especially July 2016.

Visual inspection of the data and an augmented Dickey–Fuller test revealed all outcome measures were stationary (Dickey & Fuller, 1981).¹⁸ Inspection of a correlogram, as well as inspection of significance in multiple lags, indicate there were no structural breaks or gradual pattern changes in the significance or size of the lag structure; therefore, no moving averages were applied and no seasonality was detected. Results of a Breusch–Godfrey test (Breusch, 1978), however, revealed the presence of statistically significant autocorrelation in the monthly data. Given the results of these assumption tests, an ARIMA(1,0,0) model is the most appropriate and conservative estimator for the data.¹⁹ The long-term decline in felonious killings captured in Figures 1 and 2 raises some concern regarding

TABLE 3 Interrupted time series results, felonious officer deaths

| Variable | Model 1 | Model 2 | Model 3 | Model 4 |
|---------------|---------------------|---------------------|----------------------|---------------------|
| Ferguson | −2.541** (1.002) | −1.428** (0.636) | −0.898* (0.466) | −1.624** (0.751) |
| 1970s | | 5.097*** (0.362) | | 5.688*** (0.715) |
| Lag Felonious | | | 0.620*** (0.042) | −0.136 (0.109) |
| Constant | 8.302*** (0.271) | 7.150*** (0.203) | 3.139*** (0.381) | 8.136*** (0.822) |
| ARMA | 0.381*** (0.038) | 0.133*** (0.041) | −0.318*** (0.055) | 0.269*** (0.103) |
| Sigma | 3.570*** (0.111) | 3.228*** (0.094) | 3.481*** (0.106) | 3.212*** (0.093) |
| N | 563 | 563 | 561 | 561 |

Note. Standard errors in parentheses.
* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

how that decline might affect the ARIMA analysis. Regression analysis results indicate that the 1970s experienced significantly more police deaths than did the 1980s ($b = -3.48$, $p < .001$), the 1990s ($b = -5.73$, $p < .001$), the 2000s ($b = -5.08$, $p < .001$), and the 2010s ($b = -7.36$, $p < .001$). As a result, the 1970s are included as a control in the models. A 1-month lag variable is also included to control for month-to-month autocorrelation.

Table 3 displays the ARIMA results in stepwise fashion. Model 1 includes just the intervention variable (Ferguson), and Models 2 and 3 include the controls (1970s and 1-month lag, respectively). Model 4 includes all variables. The Ferguson variable was statistically significant in all four models, indicating a statistically significant abrupt-permanent effect. Notably, the effect is negative. The coefficient of -1.624 in Model 4 indicates that, on average, there were slightly more than 1.6 fewer felonious police officer deaths per month after the August 2014 death of Michael Brown (compared with pre-August 2014).²⁰ This result directly contradicts the hypothesized “war on cops,” in which an increase in felonious killings after August 2014 is predicted. The results here show the opposite. In the context of nearly 50-year monthly trends, our results show a statistically significant decline in felonious killings of police after Michael Brown's death.

4 | DISCUSSION

Police officer line-of-duty deaths have received significant scholarly attention over the last several decades. Studies have disproportionately been focused on felonious killings of police, however, resulting in only a partial picture of the overall hazards of the profession. A full understanding of the dangerousness of policing requires a comprehensive investigation of all line-of-duty deaths—both felonious and nonfelonious—over an extended period of time. We employed this approach in the current study, and several interesting findings emerged from the analysis.

The most compelling finding from the current study is how dramatically the dangerousness of policing has declined since 1970. The overall rate of line-of-duty deaths (per 100,000 officers) has dropped by 75%. The rate of felonious deaths has dropped by 80%, and the rate of nonfelonious deaths has

declined by 69%. Also notable is how the gap between felonious and nonfelonious deaths closed over time. In the 1970s, felonious deaths far outnumbered nonfelonious deaths. By the mid-1990s, that gap disappeared. Simply put, policing in the second decade of the twenty-first century is much safer than it was 50 years ago.

Numerous factors have likely driven these declines. Certainly the diffusion of and improvements in body armor have played a role (Pate & Fridell, 1993). FBI data show that officers are significantly more likely to survive a felonious attack if they are wearing soft body armor (Federal Bureau of Investigation, 1995). The declines in officer deaths shown in this study are explained, at least in part, by the increased use of body armor. Advancements in trauma care have also undoubtedly saved officers' lives. Moreover, enhanced training, better policy, better supervision, and technological advances have likely played a role in the declines described here. For example, the percentage of deaths from accidental gunfire has declined by 59%, and the percentage of deaths resulting from aircraft crashes has dropped by nearly 70%. Both are likely explained by safety enhancements (it is safer to fly now than it was in the 1970s) and better training (gun safety). Also, the quality and quantity of police training has increased considerably over time, particularly with regard to use of force, de-escalation, crisis intervention training, and tactical engagement (Fyfe, 1986; President's Task Force on 21st Century Policing, 2015; Teller, Munetz, Gil, & Ritter, 2006). The focus of these trainings is to give officers a larger, more sophisticated set of skills to handle potentially violent encounters successfully. Additionally, concomitant advances in administrative policy have provided officers with detailed information to guide their decision making during such encounters (White & Fradella, 2016). In short, the policing profession has taken steps during the last 50 years to increase safety and reduce risk for officers. The results here indicate those efforts have been successful.

One factor that does not seem to have played a clear role is violent crime at the national level. The violent crime rate increased steadily and significantly from 1970 through the mid-1990s. At the same time, however, the number of officer deaths declined significantly. The violent crime rate began dropping significantly in the mid-1990s and that trend persisted through 2015. During the same period, the number of officer deaths began to plateau. In simple terms, if violent crime is a proxy measure of the dangerousness of the environment in which police work, it does not seem to correlate well with actual dangerousness of the profession (measured as officer deaths) at the national level.

The second major finding from the current study involves the extraordinary stability over time in key features of both felonious and nonfelonious deaths. The consistency over time is all the more remarkable given the significant declines in the prevalence of deaths. For nearly 50 years, deaths varied little in terms of geography (state), time (month), and for the most part, cause of death. With felonious deaths, gunfire was the cause in 70% or more of deaths.²¹ Deaths related to vehicles, both during pursuits and vehicular assaults, consistently accounted for slightly less than 20% of deaths. With nonfelonious deaths, heart attacks have been responsible for 16% to 18% of officer deaths over time. Most officer characteristics also remained consistent, such as sex, rank, marital and family status, duty status, and type of agency. In 1970, the "average" officer who died in the line of duty was male, late 30s, had 10 years on the job, was line level working at a local or county agency, on-duty, and married with children. In 2016, the characteristics of the "average" officer killed in the line of duty were much the same.

The third notable finding involves change in a small number of features of officer deaths. Both age and length of service of officers increased over time, perhaps reflecting larger changes in the age of the workforce. Nonfelonious deaths became increasingly common among officers working for county/parish agencies, which may also be tied to the increase in deaths resulting from motorcycle/automobile accidents (e.g., perhaps officers in county/parish agencies spend more time driving because they are responsible for patrolling more territory, compared with local municipal officers). Felonious deaths increasingly involved supervisors and detectives. Perhaps this trend is explained by a

shift to police strategies that have increased the “street time” of supervisors and detectives (i.e., leading to an increase in time at risk of assault). For example, in problem-oriented policing, community-oriented policing, and focused deterrence, more direct engagement with the community (and suspects) is emphasized, including among supervisors and detectives. Moreover, application of proactive management approaches such as Compstat may also have generated an “increased exposure” effect for supervisors and detectives. And there were some notable shifts in cause of death, particularly among nonfelonious cases: Accidental gunfire and aircraft incidents both declined notably. Trends in cause of death among felonious cases were affected significantly by the 9/11 terrorist attacks, but there was also a substantial increase in vehicular assaults over time.

The last major finding from our study involves an assessment of the recent “war on cops” thesis. Clearly, there is an uptick in felonious deaths of police in the last half of 2016, which is perhaps best illustrated by the 17 felonious deaths in July 2016. Although this is a troubling trend that warrants close scrutiny, our analysis puts the “war on cops” claim in a larger historical context of police dangerousness. This lens provides a critically important backdrop from which to understand this debate: more specifically, the large declines in dangerousness since 1970. Moreover, we employed interrupted time-series analysis using all 47 years of felonious death data, and the results show no evidence to support the “war on cops” thesis. In fact, our results show a statistically significant decline in felonious deaths post–August 2014.²² Also, although 2017 deaths were not included in the current study, ODMP has reported that line-of-duty deaths in 2017 were at the lowest level since 1958, which directly contradicts the “war on cops” thesis (blog.odmp.org/2018/01/odmp-report-2017-line-of-duty-deaths.html).

The current study does have several limitations that warrant consideration. First, the validity, reliability, and completeness of the data are constrained by the source: a publicly available clearinghouse on the Internet. Deaths that are not captured on the website are not reflected in our data.²³ Second, the amount of information on each death tended to decline in older cases. As a consequence, the more recent cases have less missing data. Third, to be consistent with other recent studies on the topic, officer deaths that occurred overseas and in U.S. territories were excluded. Last, the current study only examines deaths of officers. It is likely that, over time, improvements in body armor, technology, training, and trauma care have resulted in fewer officer deaths but likely have produced concomitant increases in nonfatal assaults. We do not examine that potential trend.

We also discover several areas for future research. First, in future studies, researchers should include nonfatal injuries resulting from felonious and nonfelonious circumstances to account for the larger universe of hazards faced by officers. The inclusion of nonfatal injuries would provide insights into the potential impact of enhanced trauma care on officer line-of-duty deaths. Simply put, some currently unknown proportion of the decline in deaths is explained by improved emergency care that turns potential officer deaths into nonfatal assaults. Future studies should be aimed at exploring this question. Moreover, the results here show that violent crime does not correlate well with officer line-of-duty deaths, at least at a national level over this study period. This finding warrants additional consideration. Perhaps the community violence/officer death relationship is more nuanced and is washed out by a national-level examination. Or perhaps the inclusion of nonfatal assaults would improve the correlation. Researchers should also consider contrasting different forms of danger, such as felonious attacks, car accidents, and health-related deaths (e.g., heart attacks), as the policy and training implications may vary by death type or subtype. Last, the concept of dangerousness may be extended beyond the police officer to family members. Do spouses and children experience greater risk of injury or death at home because of how the police officer deals with hazards of the job (drinking, domestic violence, etc.)? From this perspective, the consequences of dangerousness are felt beyond the police officer.

Our study represents one of the most comprehensive assessments of dangerousness in policing to date. Through our study findings, we can paint a clear picture of the declines in dangerousness over

time, as well as the extraordinary stability in key features of officer line-of-duty deaths during the last nearly 50 years. We can also provide an important historical context for the ongoing dialogue over a perceived “war on cops” in recent years, and our study findings reveal no evidence to support those claims.

ENDNOTES

¹ For a criticism of the “war on cops” rhetoric, see Balko (2015).

² The National Law Enforcement Officers Memorial Fund (nleomf.com) and the National Incident-Based Reporting System (fbi.gov/about-us/cjis/ucr/nibrs) also provide valuable data on officer deaths.

³ We recognize that a traditional definition of danger does not apply seamlessly to all nonfelonious deaths, especially medical emergencies such as heart attacks or other duty-related illnesses. Clearly, a death resulting from a heart attack is much different from a death resulting from a felonious attack. They both can be traced back to hazards of the profession, however. The broader definition of dangerousness applied in this study is grounded in this “common hazards” perspective and is consistent with Brandl’s (1996) earlier work and the views espoused in the final report of the President’s Task Force on 21st Century Policing (2015).

⁴ For an exception, see Varvarigou et al.’s (2014) study aimed at examining sudden cardiac death among American police officers from 1984 to 2010.

⁵ For examples, see Violanti et al. (2013) and the NORA Law Enforcement Fact Sheet (2011).

⁶ In a few studies, researchers have failed to find a relationship between community violence and violence against police (Chamlin & Cochran, 1994; Peterson & Bailey, 1988).

⁷ Kaminski et al. (2003) also found that assaults against police were more common in block groups with large populations of arrestees. Several study findings have revealed no relationship between indicators of economic distress and violence against police (Kent, 2010; Wilson & Zhao, 2008).

⁸ Bierie (2017) used National Incident-Based Reporting System (NIBRS) data to examine all recorded assaults against police from 2002 to 2010 ($n = 20,104$), as well as a random sample of arrests that ended peacefully ($n = 20,200$). When Bierie (2017) limited the analysis to offenses involving victims, many of the relationships weakened or disappeared altogether, suggesting that risk of assault is highly nuanced and requires deeper examination.

⁹ Researchers have generally found little evidence of a systematic post-Ferguson increase in crime nationally; instead much of the increase in crime, specifically homicide, can be attributed to a small number of cities (Pyrooz, Decker, Wolfe, & Shjarback, 2016; Rosenfeld, 2015, 2016). Shjarback et al. (2017) uncovered mixed evidence of depolicing among traffic stops in Missouri; however, depolicing was more likely to occur in jurisdictions with larger African American populations.

¹⁰ Batton and Wilson (2006) also noted that most studies are weak in terms of theoretical development and testing.

¹¹ The ODMP provides data on line-of-duty deaths for all U.S. territories (e.g., Puerto Rico, Guam, American Samoa, and U.S. Virgin Islands). These line-of-duty deaths are excluded from our analyses, however. Aside from remaining consistent with findings from prior research in which such cases were also excluded (Maguire et al., 2017), information from these U.S. territories is not included in calculations of the total number of police officers or violent crime rates derived from the FBI’s UCR. Additionally, incidents in which the victim was a police K-9 were also excluded.

¹² All members of the research team completed CITI training for conducting research with human participants and were included in the institutional review board application.

¹³ The terminology used to describe changes in the time series as “abrupt permanent,” in this context, is not meant to suggest that an effect lasts forever. This terminology refers to an effect that lasts from its inception until the end of the time series. Given the theoretical foundation of the Ferguson effect, nonfelonious deaths were set aside for this analysis.

¹⁴ The ODMP records 37 different causes of death. For much of the analysis in the current study, we collapsed cause of death into felonious and nonfelonious. Felonious deaths include assault, bomb, explosion, gunfire, poisoned, stabbed, terrorist attack, 9/11-related illness, vehicle pursuit, and vehicle assault. Nonfelonious deaths include all other causes (automobile accident, aircraft accident, struck by vehicle, accidental gunfire, drowned, etc.).

- ¹⁵ This rate is calculated by using a count of the total number of full-time sworn law enforcement officers per year. The Bureau of Justice Statistics has compiled a list, based on the FBI's "Crime in the United States" series, of the total number of full-time sworn law enforcement officers from 1975 to 2003. This list, authored by Brian Reaves, can be accessed at bjs.gov/index.cfm?ty=pbdetail&iid=2049. Counts of the total number of full-time sworn officers for years 2004–2016 can be accessed from Table 74 (Full-time Law Enforcement Employees) for each respective year's "Crime in the United States" report at ucr.fbi.gov/crime-in-the-u.s. Counts for years 1970–1974 were again derived from the "Crime in the United States" data; these measures, however, were accessed from a free CD provided by the FBI. Those interested in the FBI's "Crime in the United States" reports prior to 1995 and dating back to 1960 are instructed to send an e-mail to CRIMESTATSINFO@ic.fbi.gov.
- ¹⁶ National violent crime rates were provided by the FBI's annual "Crime in the United States" reports.
- ¹⁷ According to Table 77 (Police Employee Data) from the FBI's annual "Crime in the United States" reports, California, Texas, Florida, and New York consistently rank in the top four in terms of the number of sworn, full-time officers employed by state. New York, however, consistently employs the second most officers—ranking below California and ahead of Texas (consistently #3) and Florida (consistently #4). To explore the question of geographic stability further, one could calculate annual standardized rates of officer deaths (felonious, nonfelonious, or both) by state. The result of such an analysis would highlight whether specific states are lower or higher risk for officer deaths, beyond what would be expected given the number of police officers employed. Those state-level trends could be tracked over time.
- ¹⁸ This stationarity was observed for total deaths ($t = -16.01, p < .001$), felonious deaths ($t = -15.79, p < .001$), and nonfelonious deaths ($t = -21.56, p < .001$).
- ¹⁹ Several other estimators were also used, and the substantive results remained consistent across estimator choice.
- ²⁰ To ensure validity of the effects of Ferguson on felonious officer deaths, ARIMA models for total officer deaths and nonfelonious officer deaths were also estimated. By using the same predictors and 1-month lag as in Model 4, the intervention variable (Ferguson) was not significantly related to nonfelonious deaths but did significantly predict total officer deaths ($b = -2.373, p < .01$).
- ²¹ The September 11, 2001 terrorist attacks, as well as deaths later from 9/11-related illnesses, represent a departure from these long-term trends.
- ²² Our ARIMA findings differ from those of Maguire et al. (2017), and this difference may be explained by one or more of the following: We aggregated to the month, not to the week, and we include 40 years of data on the front end and an additional 9 months on the back end (Maguire et al.'s time frame is from January 2010 to March 2016).
- ²³ In a handful of recent studies, scholars have used data from the ODMP, including Maguire et al. (2017), Eliason (2011), Johnson (2013), and Varvarigou et al. (2014).

REFERENCES

- Alpert, G. P. (1997). *Police pursuit: Policies and training*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, National Institute of Justice.
- Bailey, W. C. (1982). Capital punishment and lethal assaults against police. *Criminology*, 19, 608–625.
- Bailey, W. C. & Peterson, R. D. (1987). Police killings and capital punishment: The post-Furman period. *Criminology*, 25, 1–26.
- Bailey, W. C. & Peterson, R. D. (1994). Murder, capital punishment, and deterrence: A review of the evidence and an examination of police killings. *Journal of Social Issues*, 50, 53–73.
- Balko, R. (2015). Once again: There is no 'war on cops.' And those who claim otherwise are playing a dangerous game. *The Washington Post*. Sept. 10. Received from [washingtonpost.com/news/the-watch/wp/2015/09/10/once-again-there-is-no-war-on-cops-and-those-who-claim-otherwise-are-playing-a-dangerous-game/](https://www.washingtonpost.com/news/the-watch/wp/2015/09/10/once-again-there-is-no-war-on-cops-and-those-who-claim-otherwise-are-playing-a-dangerous-game/).
- Batton, C. & Wilson, S. (2006). Police murders: An examination of historical trends in the killing of law enforcement officers in the United States, 1947 to 1998. *Homicide Studies*, 10, 79–97.
- Bierie, D. M. (2017). Assault of police. *Crime & Delinquency*, 63, 899–925.

- Bierie, D. M., Detar, P. J., & Craun, S. W. (2016). Firearm violence directed at police. *Crime & Delinquency*, 62, 501–524.
- Brandl, S. G. (1996). In the line of duty: A descriptive analysis of police assaults and accidents. *Journal of Criminal Justice*, 24, 255–264.
- Breusch, T. S. (1978). Testing for autocorrelation in dynamic linear models. *Australian Economic Papers*, 17, 334–355.
- Canterbury, C. (2016). Letter from National FOP President Canterbury to President Obama. *Washington Examiner*. Feb. 15. Retrieved from washingtonexaminer.com/obama-silence-on-cop-deaths-ripped-ill-save-you-a-spot-at-funerals-mocks-sheriff/article/2583289.
- Cardarelli, A. P. (1968). An analysis of police killed by criminal action: 1961–1963. *Journal of Criminal Law, Criminology, and Police Science*, 59, 447–453.
- Chamlin, M. B. (1989). Conflict theory and police killings. *Deviant Behavior*, 10, 353–368.
- Chamlin, M. B. & Cochran, J. K. (1994). Opportunity, motivation, and assaults on police: A bivariate ARIMA analysis. *American Journal of Criminal Justice*, 19, 1–19.
- Covington, M. W., Huff-Corzine, L., & Corzine, J. (2014). Battered police: Risk factors for violence against law enforcement officers. *Violence & Victims*, 29, 34–52.
- Dickey, D. A. & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49, 1057–1072.
- Duhart, D. T. (2001). *Violence in the workplace, 1993–99*. Washington, DC: U.S. Department of Justice, Office of Justice Programs.
- Eliason, S. L. (2011). Death in the line of duty: Game warden mortality in the United States, 1886–2009. *American Journal of Criminal Justice*, 36, 319–326.
- Ellis, D., Choi, A., & Blaus, C. (1993). Injuries to police officers attending domestic disturbances: An empirical study. *Canadian Journal of Criminology*, 35, 149–168.
- Federal Bureau of Investigation. (1995). *Law enforcement officers killed and assaulted, 1994*. Washington, DC: U.S. Department of Justice.
- Federal Bureau of Investigation. (2010). *Law enforcement officers killed and assaulted, 2009*. Washington, DC: U.S. Department of Justice.
- Fridell, L., Faggiani, D., Taylor, B., Brito, C. S., & Kubu, B. (2009). The impact of agency context, policies, and practices on violence against police. *Journal of Criminal Justice*, 37, 542–552.
- Fridell, L. A. & Pate, A. M. (1993). Death on patrol: Killings of police officers. In R. G. Dunham & G. P. Alpert (Eds.), *Critical issues in policing: Contemporary readings*, Vol. 2. Prospect Heights, IL: Waveland Press.
- Fridell, L. A. & Pate, A. M. (1995). *Death on patrol: Felonious killings of police officers* (Final report). Washington, DC: National Institute of Justice, U.S. Department of Justice.
- Fridell, L. A. & Pate, A. M. (2001). The other side of deadly force: The felonious killings of police officers. In R. G. Dunham & G. P. Alpert (Eds.), *Critical issues in policing: Contemporary readings*, Vol. 4. Prospect Heights, IL: Waveland Press.
- Fyfe, J. J. (1986). The split-second syndrome and other determinants of police violence. In A. T. Campbell & J. J. Gibbs (Eds.), *Violent transactions*. Oxford, U.K.: Basil Blackwell.
- Garner, J. & Clemmer, E. (1986). *Danger to police in domestic disturbances—A new look* (Research in Brief). Washington, DC: National Institute of Justice, U.S. Department of Justice.
- Gibbs, J. C., Ruiz, J., & Klapper-Lehman, S. A. (2014). Police officers killed on duty: Replicating and extending a unique look at officer deaths. *International Journal of Police Science and Management*, 16, 277–287.
- Hattem, J. (2015). Killings of police officers on the rise. *The Hill*. Nov. 5. Retrieved from thehill.com/policy/national-security/241594-fbi-officer-killings-on-the-rise.
- Hays, C. (2018). ‘Silence can be deadly’: 46 officers were fatally shot last year. More than triple that - 140- committed suicide. *USA Today*. Apr. 11. Retrieved from usatoday.com/story/news/2018/04/11/officers-firefighters-suicides-study/503735002/.

- Jackson, J., Bradford, B., Hough, M., Myhill, A., Quinton, P., & Tyler, T. R. (2012). Why do people comply with the law? Legitimacy and the influence of legal institutions. *British Journal of Criminology*, 52, 1051–1071.
- Jacobs, D. & Carmichael, J. T. (2002). Subordination and violence against state control agents: Testing political explanations for lethal assaults against the police. *Social Forces*, 80, 1223–1251.
- Johnson, R. R. (2013). A longitudinal examination of officer deaths from vehicle pursuits. *International Journal of Police Science and Management*, 15, 77–94.
- Kachurik, S., Ruiz, J., & Staub, M. (2013). Police officers killed on duty: A different view. *International Journal of Police Science and Management*, 15, 1–11.
- Kaminski, R. J. (2002). *An opportunity model of police homicide victimization*. Unpublished doctoral dissertation, University at Albany, State University of New York.
- Kaminski, R. J. (2004). The murder of police officers. In M. D. McShane & F. P. Williams (Eds.), *Book series: Criminal justice recent scholarship*. New York: LFB Scholarly.
- Kaminski, R. J. (2008). Assessing the county-level structural covariates of police homicides. *Homicide Studies*, 12, 350–380.
- Kaminski, R. J., Jefferis, E. S., & Chanhatisilpa, C. (2000). A spatial analysis of American police killed in the line of duty. In L. S. Turnbull, E. H. Hendrix, & B. D. Dent (Eds.), *Atlas of crime: Mapping the criminal landscape*. Phoenix, AZ: Oryx Press.
- Kaminski, R. J., Jefferis, E. S., & Gu, J. (2003). Community correlates of serious assaults on police. *Police Quarterly*, 6, 119–149.
- Kaminski, R. J. & Marvell, T. B. (2002). A comparison of changes in police and general homicides: 1930–1998. *Criminology*, 40, 171–190.
- Kaminski, R. J. & Sorenson, D. (1995). A multivariate analysis of individual, situational, and environmental factors associated with police assault injuries. *American Journal of Police*, 14, 3–48.
- Kaminski, R. J. & Stucky, T. D. (2009). Reassessing political explanations for murders of police. *Homicide Studies*, 13, 3–20.
- Kent, S. L. (2010). Killings of police in US cities since 1980: An examination of environmental and political explanations. *Homicide Studies*, 14, 3–23.
- Lester, D. (1978). Predicting murder rates of police officers in urban areas. *Police Law Quarterly*, 7, 20–25.
- Lester, D. (1981). Occupational injuries, illnesses and fatalities in police officers. *Police Chief*, 48, 43–63.
- Lester, D. (1982). Civilians who kill police officers and police officers who kill civilians: A comparison of American cities. *Journal of Police Science and Administration*, 10, 384–387.
- Lester, D. (1984). The murder of police officers in American cities. *Criminal Justice and Behavior*, 11, 101–113.
- Mac Donald, H. (2015). The new nationwide crime wave. *Wall Street Journal*. May 29. Retrieved from wsj.com/articles/the-new-nationwide-crime-wave-1432938425.
- Mac Donald, H. (2016). *The war on cops: How the new attack on law and order makes everyone less safe*. New York: Encounter Books.
- Maguire, E. R., Nix, J., & Campbell, B. A. (2017). A war on cops? The effects of Ferguson on the number of U.S. police officers murdered in the line of duty. *Justice Quarterly*, 34, 739–758.
- Margarita, M. (1980). Killing the police: Myths and motives. *The ANNALS of the American Academy of Political and Social Science*, 452, 63–71.
- Mastrofski, S. D., Snipes, J. B., & Supina, A. E. (1996). Compliance on demand: The public's response to specific police requests. *Journal of Research in Crime and Delinquency*, 33, 269–305.
- McDowall, D. & McCleary, R. (2014). Interrupted time series models. In G. Bruinsma & D. Weisburd (Eds.), *Encyclopedia of criminology and criminal justice*, Vol. 2. New York: Springer.
- McDowall, D., McCleary, R., Meidinger, E. E., & R. A. Hay Jr. (1980). *Interrupted time series analysis*. Newbury Park, CA: Sage.

- Meyer, K. C., Magedanz, T. C., Dahlin, D. C., & Chapman, S. G. (1981). A comparative assessment of assault incidents: Robbery related, ambush, and general police assaults. *Journal of Police Science and Administration*, 9, 1–18.
- Morrison, P. N. & Meyer, K. C. (1974). *A microanalysis of assaults on police in Austin, Texas*. Norman: Bureau of Government Research, University of Oklahoma.
- National Institute of Occupational Safety and Health (NIOSH). (1996). *Violence in the workplace, risk factors and prevention strategies* (Current Intelligence Bulletin 57). Washington, DC: U.S. Department of Health and Human Service, CDC.
- NORA Law Enforcement Fact Sheet. (2011). *Safety and health in law enforcement*. CDC. Retrieved from cdc.gov/niosh/docs/2011-134/pdfs/2011-134.pdf.
- Pate, A. M. & Fridell, L. M. (1993). *Police use of force: Official reports, citizen complaints, and legal consequences, volumes I and II*. Washington, DC: The Police Foundation.
- Peterson, R. D. & Bailey, W. C. (1988). Structural influences on the killing of police: A comparison with general homicides. *Justice Quarterly*, 5, 207–233.
- President's Task Force on 21st Century Policing. (2015). *Final report of the president's task force on 21st century policing*. Washington, DC: Office of Community Oriented Policing Services. Retrieved from cops.usdoj.gov/pdf/taskforce/TaskForce_FinalReport.pdf.
- Pyrooz, D. C., Decker, S. H., Wolfe, S. E., & Shjarback, J. A. (2016). Was there a Ferguson effect on crime rates in large U.S. cities? *Journal of Criminal Justice*, 46, 1–8.
- Quinet, K. D., Bordua, D. J., & Lassiter, W. (1997). Line of duty police deaths: A paradoxical trend in felonious homicides in the United States. *Policing & Society*, 6, 283–296.
- Rabe-Hemp, C. E. & Schuck, A. M. (2007). Violence against police officers: Are female officers at greater risk? *Police Quarterly*, 10, 411–428.
- Regens, J. L., Meyer, K. C., Swanson, C. G., & Chapman, S. G. (1974). *An analysis of assaults on municipal police officers in 46 south central cities*. Norman: Bureau of Government Research, University of Oklahoma.
- Rosenfeld, R. (2015). Was there a “Ferguson effect” on crime in St. Louis? Washington, DC: The Sentencing Project. Retrieved from sentencingproject.org/doc/publications/inc_Ferguson_Effect.pdf.
- Rosenfeld, R. (2016). *Documenting and explaining the 2015 homicide rise: Research directions*. Washington, DC: National Institute of Justice.
- Safir, H. (2015). Police commissioner: Bad old days of crime may be back. *Time Magazine*. June 5. Retrieved from time.com/3908254/howard-safir-crime.
- Shjarback, J. A., Pyrooz, D. C., Wolfe, S. E., & Decker, S. H. (2017). De-policing and crime in the wake of Ferguson: Racialized changes in the quantity and quality of policing among Missouri police departments. *Journal of Criminal Justice*, 50, 42–52.
- Shjarback, J. A. & White, M. D. (2016). Departmental professionalism and its impact on indicators of violence in police–citizen encounters. *Police Quarterly*, 19, 32–62.
- Snyder, H. N. (2011). *Arrest in the United States, 1980–2009*. Washington, DC: Bureau of Justice Statistics.
- Southwick, L. (1998). An economic analysis of murder and accident risks for police in the United States. *Applied Economics*, 30, 593–605.
- Stanford, R. M. & Mowry, B. L. (1990). Domestic disturbance danger rate. *Journal of Police Science and Administration*, 17, 244–249.
- Swedler, D. I., Simmons, M. M., Dominici, F., & Hemenway, D. (2015). Firearm prevalence and homicides of law enforcement officers in the United States. *American Journal of Public Health*, 105, 2042–2048.
- Teller, J. L., Munetz, M. R., Gil, K. M., & Ritter, C. (2006). Crisis intervention team training for police officers responding to mental disturbance calls. *Psychiatric Services*, 57, 232–237.
- Tyler, T. R. (2006). *Why people obey the law*. Princeton, NJ: Princeton University Press.

- Uchida, C. D., Brooks, L. W., & Koper, C. S. (1987). Danger to police during domestic encounters: Assaults on Baltimore county police, 1984–86. *Criminal Justice Policy Review*, 2, 357–371.
- Varvarigou, V., Farioli, A., Korre, M., Sato, S., Dahabreh, I. J., & Kales, S. N. (2014). Law enforcement duties and sudden cardiac death among police officers in United States: Case distribution study. *BMJ*, 349, g6534.
- Violanti, J. M., Hartley, T. A., Gu, J. K., Fedulegn, D., Andrew, M. E., & Burchfiel, C. M. (2013). Life expectancy in police officers: A comparison with the U.S. general population. *International Journal of Emergency Mental Health*, 15, 217–228.
- Violanti, J. M., Vena, J. E., & Petralia, S. (1998). Mortality of a police cohort: 1950–1990. *American Journal of Industrial Medicine*, 33, 366–373.
- White, M. D. & Fradella, H. F. (2016). *Stop and frisk: The use and abuse of a controversial policing tactic*. New York: New York University Press.
- Willits, D. W. (2014). The organisational structure of police departments and assaults on police officers. *International Journal of Police Science and Management*, 16, 140–154.
- Wilson, S. & Zhao, J. (2008). Determining the correlates of police victimization: An analysis of organizational level factors on injurious assaults. *Journal of Criminal Justice*, 36, 461–468.

AUTHORS' BIOGRAPHIES

Michael D. White is a professor in the School of Criminology and Criminal Justice at Arizona State University (ASU) and is an associate director of ASU's Center for Violence Prevention and Community Safety. He received his Ph.D. in criminal justice from Temple University in 1999. Prior to entering academia, Prof. White worked as a deputy sheriff in Pennsylvania. His primary research interests involve the police, including use of force, technology, and misconduct. His recent work has been published in *Criminology*, *Justice Quarterly*, *Criminology & Public Policy*, and *Criminal Justice and Behavior*.

Lisa M. Dario is an assistant professor in the School of Criminology and Criminal Justice at Florida Atlantic University. She received her Ph.D. in criminology and criminal justice from Arizona State University in 2016. Prof. Dario's current research is focused on a variety of contemporary topics in policing, including community-oriented policing, police legitimacy, and officer line-of-duty deaths. Her recent research has been published in *Justice Quarterly*, *Criminal Justice and Behavior*, *Journal of Experimental Criminology*, *Crime & Delinquency*, and *Women and Criminal Justice*.

John A. Shjarback is an assistant professor in the Department of Criminal Justice at the University of Texas at El Paso. He earned his Ph.D. in criminology and criminal justice from Arizona State University. His research interests center on policing, specifically environmental and organizational influences on discretionary officer behavior and current issues and trends. His recent work has been featured in *Crime & Delinquency*, *Journal of Criminal Justice*, *Police Quarterly*, and *Policing: An International Journal*.

How to cite this article: White MD, Dario LM, Shjarback JA. Assessing dangerousness in policing: An analysis of officer deaths in the United States, 1970–2016. *Criminology & Public Policy*. 2019;18:11–35. <https://doi.org/10.1111/1745-9133.12408>